

CLAIMS:

- 235
1. A method of energy conversion comprising:

applying energy to an energy conversion material comprising a base material and a moment activator, wherein said energy conversion material has dipoles in a stable state;

displacing the dipoles to an unstable state; and

returning the dipoles to a stable state.

2. The method of claim 1, wherein the base material comprises a polymer selected from the group consisting of polyvinyl chloride, acrylic rubber, acrylonitrile-butadiene rubber, styrene-butadiene rubber, chloroprene rubber, butadiene rubber, natural rubber, isoprene rubber, and chlorinated polyethylene.

3. The method of claim 1, wherein the base material comprises:

a polymer selected from the group consisting of polyvinyl chloride, polyethylene, polypropylene, ethylene-vinyl acetate copolymer, polymethyl methacrylate, polyvinylidene fluoride, polyisoprene, polystyrene, styrene-butadiene-acrylonitrile copolymer, and styrene-acrylonitrile copolymer; and

a plasticizer.

4. The method of claim 1, wherein the moment activator is a compound having a benzothiazyl, benzotriazyl, or a diphenyl acrylate radical.

5. The method of claim 4, wherein the moment activator comprises a compound selected from the group consisting of N, N-dicyclohexylbenzothiazyl-2-sulfonamide (DCHBSA), 2-mercaptobenzothiazole (MBT), dibenzothiazylsulfide (MBTS), N-cyclohexylbenzothiazyl-2-sulfenamide (CBS), N-tert-butylbenzophthiazyl-2-sulfenamide (BBS), N-oxydiethylenebenzothiazyl-2-sulfonamide (OBS), or N, N-diisopropylbenzothiazyl-2-sulfenamide (DPBS), 2-(2'-hydroxy-3'-(3'', 4'', 5'', 6'' tetrahydrophthalimidemethyl)-5'-methylphenyl)-benzotriazole (2HPMMB), 2-2'-hydroxy-5'-methylphenyl)-benzotriazole (2HMPB), 2-(2'-hydroxy-3'-t-butyl-5'-methylphenyl)-5-chlorobenzotriazole (2HBMPCB), 2-(2'-hydroxy-3',5'-di-t-butylphenyl)-5-chlorobenzotriazole (2HDBPCB), and ethyl-2-cyano-3,3-di-phenylacrylate.

6. The method of claim 5, wherein the moment activator is a compound selected from the group consisting of N, N-dicyclohexylbenzothiazyl-2-sulfonamide (DCHBSA), N-cyclohexylbenzothiazyl-2-sulfenamide (CBS), 2-(2'-hydroxy-3'-(3'', 4'', 5'', 6'' tetrahydrophthalimidemethyl)-5'-methylphenyl)-benzotriazole (2HPMMB), and ethyl-2-cyano-3,3-di-phenylacrylate.

7. The method of claim 1, wherein the moment activator is present in an amount of 10 to 500 parts by weight per 100 parts by weight of the base material.

8. The method of claim 1, wherein the energy conversion material further comprises filler.

9. The method of claim 8, wherein the filler comprises mica scales, glass pieces, carbon fibers, calcium carbonate, barite, and precipitated barium sulfate.

10. The method of claim 8, wherein the filler is present in an amount of 10 to 500 parts by weight per 100 parts by weight of the base material.

11. The method of claim 10, wherein the filler is present in an amount of 20 to 80 parts by weight.

12. The method of claim 1, wherein the energy conversion material is an unconstrained vibration damper.

13. The method of claim 1, wherein the energy conversion material is a vibration damping paint.

14. The method of claim 13, wherein the moment activator is present in an amount of 10 to 100 parts by weight per 100 parts by weight of the base material.

15. The method of claim 13, wherein the vibration damping paint further comprises an additive selected from the group consisting of dispersing agents, wetting agents, thickeners, antifoaming agents, and colorants.

16. The method of claim 13 further comprising applying the vibration damping paint to a surface by an air spray gun, airless spray gun, or brush.

17. The method of claim 1, wherein the energy is sound energy and the energy conversion material is a sound absorptive material.

18. The method of claim 17, wherein the base material comprises a polymer selected from the group consisting of polyvinyl chloride, polyethylene, polypropylene, ethylene-vinyl acetate copolymer, polymethyl methacrylate, polyvinylidene fluoride, polyisoprene, polystyrene, styrene-butadiene-acrylonitrile copolymer, styrene-acrylonitrile copolymer, polyester, polyurethane, polyamide, polyvinylidene, polyacrylonitrile, polyvinylalcohol, cellulose, acrylonitrile-butadiene rubber, styrene-butadiene rubber, butadiene rubber, natural rubber, isoprene rubber, chlorinated polyethylene and chloroprene rubber.

19. The method of claim 17, wherein the moment activator is present in an amount of 10 to 430 parts by weight per 100 parts by weight of the base material.

20. The method of claim 17, wherein the sound absorptive material further comprises corrosion inhibitor.

21. The method of claim 17, wherein the sound energy has a frequency of 1,000 Hz or less.

22. The method of claim 21, wherein the sound energy has a frequency of 500 Hz or less.

23. The method of claim 17, wherein the sound absorptive material is foamed or unfoamed and further comprises a form selected from the group consisting of sheet, film, fiber, and block.

24. The method of claim 17, wherein the sound absorptive material is disposed adjacent to a fiber surface.

25. The method of claim 1, wherein the energy conversion material is an impact absorptive material.

26. The method of claim 25, wherein the moment activator is present in an amount of 10 to 200 parts by weight per 100 parts by weight of the base material.

27. The method of claim 25, wherein the impact absorptive material is foamed or unfoamed and further comprises a form selected from the group consisting of sheet, film, fibers, front fork, tape, and blocks.

28. The method of claim 25, wherein the impact absorptive material is incorporated into a shoe sole.

29. The method of claim 1, wherein the energy is electromagnetic energy and the energy conversion material is an electromagnetic wave absorptive material.

30. The method of claim 29, wherein the electromagnetic energy has a frequency of 500 to 2,000 MHz.

31. The method of claim 29, wherein the moment activator is present in an amount of 10 to 200 parts by weight per 100 parts by weight of the base material.

32. The method of claim 29, wherein the electromagnetic wave absorptive material is foamed or unfoamed and further comprises a form selected from the group consisting of paint, sheet, film, fibers, and blocks.

33. The method of claim 1, wherein the energy conversion material is a piezoelectric material.

34. The method of claim 33, wherein the moment activator is present in an amount in the range of 10 to 200 parts by weight per 100 parts by weight of the base material.

35. The method of claim 1, wherein said energy is selected from the group consisting of vibrational energy, sound energy, impact energy, and electromagnetic energy.

36. A method of vibration damping comprising:

applying vibrational energy to a vibration damping material comprising acrylic rubber and a moment activator comprising N, N-dicyclohexylbenzothiazyl-2-sulfonamide (DCHBSA), wherein said vibration damping material has dipoles in a stable state;

displacing the dipoles to an unstable state; and

returning the dipoles to a stable state.